

## CLAIMS

1. A membrane electrode assembly for a proton-exchange membrane fuel cell, comprising a polymer electrolyte membrane and an electrode catalyst layer,

5        wherein at least a part of the polymer electrolyte membrane infiltrates into the electrode catalyst layer, and

         wherein the polymer electrolyte membrane is formed by polymerizing a composition containing at  
10        least a compound having proton conductivity and a compound having activity to an active energy ray, or a composition containing at least a compound having proton conductivity and activity to the active energy ray.

15        2. A membrane electrode assembly according to claim 1, wherein a reinforcement member composed of an electrical insulator is provided inside the polymer electrolyte membrane.

         3. A production method for a membrane electrode  
20        assembly for a proton-exchange membrane fuel cell, the assembly comprising a polymer electrolyte membrane and an electrode catalyst layer, at least a part of the polymer electrolyte membrane infiltrating into the electrode catalyst layer, the production  
25        method comprising the steps of:

         coating the electrode catalyst layer with a composition containing at least a compound having

proton conductivity and a compound having activity to an active energy ray, or a composition containing at least a compound having proton conductivity and activity to the active energy ray, to form a

5 precursor layer of the polymer electrolyte membrane composed of the composition, at least a part of the composition infiltrating into the electrode catalyst layer; and

10 polymerizing the composition by irradiating the precursor layer with the active energy ray, to form a polymer electrolyte membrane at least a part of which infiltrates into the electrode catalyst layer.

4. A production method for a membrane electrode assembly according to claim 3, wherein the electrode catalyst layer has a thickness of 0.01 to 200  $\mu\text{m}$ , and an infiltration amount of the composition into the electrode catalyst layer is equal to or smaller than the thickness of the electrode catalyst layer.

5. A production method for a membrane electrode assembly according to claim 3, wherein the composition is coated after a reinforcement member composed of an electrical insulator is provided on the electrode catalyst layer.

6. A proton-exchange membrane fuel cell comprising a membrane electrode assembly for a proton-exchange membrane fuel cell, the membrane electrode assembly comprising a polymer electrolyte

membrane and an electrode catalyst layer,

wherein at least a part of the polymer electrolyte membrane infiltrates into the electrode catalyst layer, and

- 5        wherein the polymer electrolyte membrane is formed by polymerizing a composition containing at least a compound having proton conductivity and a compound having activity to an active energy, or a composition containing at least a compound having
- 10    proton conductivity and activity to the active energy ray.